Tut09

Q1b

A → B could hold

B → A does not hold

A → C does not hold

C → B does not hold

Q2

a. A+ = {A, B}

b. ACEG+ = {A, B, C, E, F, G}

c. BD+ = {A, B, C, D, E, F, G}

Q3

a. ACD+ = {A, B, C, D, E}

   BCD

   CDE

b. in 3NF

c. not in BCNF

Q4a

i. B+ = {A, B, C, D}

ii. BD

iii. ABC, BCD

iv. A+ = {A, B, C, D}

v. AB, CD, BC, AD

vi. A

Q4b

i. not BCNF

.i. not BCNF

.i. not BCNF

.v. not BCNF

v. not BCNF

/i. BCNF

Q4c

i. not 3NF

.i. not 3NF

.i. 3NF

.v. not 3NF

v. 3NF

/i. 3NF

Q5

Team(name, captain)

candidate key: name

fd: {name → captain}

in BCNF

Player(name, teamPlayedFor)

candidate key: name

fd: {name → teamPlayedFor}

in BCNF

TeamColours(teamName, colour): no non-trivial fds

in BCNF

Account Table Example

Acc(AccNo, balance, customer, branch, address, assets)

candidate key: AccNo

fd: {

AccNo → balance, customer, branch, address, assets

branch → assets

}

not in BCNF

not in 3NF

BCNF Normalisation

split table

(branch, assets) {branch → assets} key: branch ⇒ in BCNF

(AccNo, balance, customer, branch, address) {AccNo → balance, customer, branch, address} key: AccNo ⇒ in BCNF

result

(branch, assets)

(AccNo, balance, customer, branch, address)

Q7 - 3NF

i.

candidate key: B

fd: {C → D, C → A, B → C}

reduced minimal cover: {C → AD, B → C}

split into tables

CAD, BC

need relation with key?

no need to add extra table because candidate key B is in one of the resulting tables

result

CAD, BC

ii.

candidate key: BD

fd: {B → C, D → A}

reduced minimal cover: {B → C, D → A}

split into tables

BC, DA

need relation with key?

yes, BD

result

BC, DA, BD

iv.

candidate key: AB, CD, BC, AD

fd: {A → B, BC → D, A → C}

reduced minimal cover: {A → BC, BC → D}

split into tables

ABC, BCD

need relation with key?

no, ABC has candidate key AB

result

ABC, BCD

Q3 - BCNF

i.

candidate key: B

fd: {C → D, C → A, B → C}

reduced minimal cover: {C → AD, B → C}

if we choose {C → AD}:

split table ABCD (choose C → AD)

CAD {C → AD} key: C ⇒ in BCNF

  BC {B → C} key: B ⇒ in BCNF

result

CAD, BC

if we choose {B → C}

spit table ABCD (choose B → C)

BC {B → C} key: B ⇒ BCNF

  ABD {} key: ABD ⇒ BCNF

result

CD, ABD

ii.

candidate key: BD

fd: {B → C, D → A}

reduced minimal cover: {B → C, D → A}

split table ABCD (choose B → C)

BC {B → C} key: B ⇒ in BCNF

ABD {D → A} key: BD ⇒ not in BCNF

split table ABD (choose D → A)

AD {D → A} key: D ⇒ in BCNF

BD {} key: BD ⇒ in BCNF

result

BC, AD, BD

iii.

candidate keys: ABC, BCD

fd: {ABC → D, D → A}

reduced minimal cover: {ABC → D, D → A}

split table ABCD (choose D → A)

AD {D → A} key: D ⇒ in BCNF

BCD {} key: BCD ⇒ in BCNF

result

AD, BCD